ROTARY SANDING TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a rotary sanding tool for moldings fabricated preferably from wood, having a one-part or multi-part pad and having at least one peripheral row of abrasive-coated sanding segments that are slipped onto pad elements affixed to the pad.

2. Description of Prior Art

The pad of the rotary sanding tool under consideration is usually fabricated from metal, for example aluminum. The pad elements are made for example of a metal section rail and a body of elastic material, for example sponge rubber, the shape thereof being adapted to the outline of the surfaces to be sanded. The sanding segment is slipped onto the pad elements. The sanding segment is made up of a substrate molded from a plastic. The substrate is coated with the abrasive on the outside. The sanding segment is likewise adapted to the outline of the surfaces to be sanded or to the outline of the pad element body made of flexible material. The rotary sanding tool can be fashioned as a single sanding wheel or as a double sanding wheel. If it is a double sanding wheel, two pads are interlaced into each other. The sanding segments of one row are then angularly spaced apart from one another so that the sanding segments of the other row lie therebetween. The double sanding wheel offers the advantage that more than two surfaces can be sanded at the same time.

In a known rotary sanding tool the sanding segments are held by two clamping covers frontally overreaching projections of the sanding segments, which clamping covers are mounted on the sanding shaft. If the sanding wheel is a double sanding wheel, four clamping covers are accordingly necessary.

These previously known rotary sanding tools have proven optimal in practice. On economic grounds, so-called "throughfeed" machines, in which a plurality of rotary sanding tools are mounted on one sanding shaft, are increasingly being used. The workpiece passes along an arbitrary number of machining assemblies. As a rule these are one-sided or double-sided automated molding or edging machines, so that the axis values therefore are controlled/adjusted by CNC. These rotary sanding tools are then used one after another for machining. In the previously known rotary sanding tools, the rotary sanding tool must be dismounted in order to change the sanding segments and also to change the pad elements. This, however, is particularly time-consuming if a plurality of rotary sanding tools are mounted on one sanding shaft, because at least some of the rotary sanding tools whose sanding segments and pad elements do not have to be changed out must also be taken off the sanding shaft.

SUMMARY OF THE INVENTION

It is a goal of the invention to design a rotary sanding tool of the kind described at the outset in such a way that the changing of sanding segments and if applicable also of pad elements can be performed in a very simple manner and in a very short time, in particular the rotary sanding wheel is to be designed in such a way that the changing of sanding segments and if applicable also of pad elements can be performed without the necessity of dismounting, so that the changing of sanding segments and if applicable of pad elements is possible without the need to take these off the sanding shaft.

The stated goal is achieved with a locking unit movable in the axial direction, with which at least the sanding segments of one peripheral row can be affixed to the pad elements.

With the locking unit it is now possible that, after the sanding segments have been

slipped onto the pad elements, the sanding segments are locked simultaneously. For changing and preliminary unlocking, the locking unit is moved in the opposite direction. The locking unit does away with the dismounting of the rotary sanding tool in order to change sanding segments. In this way it is possible for these sanding segments to be changed when the rotary sanding tool is situated on the sanding shaft. This is particularly advantageous when a plurality of rotary sanding tools are arranged on one sanding shaft. The locking unit must be configured in such a way that the sanding segments do not come loose during the sanding process, when the rotational speed of the rotary sanding tool is relatively high. Provision is therefore made that the locking unit is displaceable in the axial direction relative to the pad or pads. The centrifugal forces arising during the sanding process then do not contribute to a displacement of the locking unit. In terms of design, the locking unit can be fashioned in a particularly simple way if it has a cage and if, in the lower lateral marginal regions of the sanding segments, which regions are averted from the abrasive coatings, profilings are provided in such a way that the sanding segments are positively connected to the cage in the locked position. The positive connection between the locking unit and the sanding segments offers the advantage that no mechanical connectors are necessary. What is more, the sanding segments, preferably fabricated by deep drawing from a foil of relatively great thickness, are treated gently. This profiling must be designed so that movement, for example tipping, of the sanding segments is avoided. It is therefore provided that on each lateral margin of a sanding segment there are at least two projections forming the profiling and that the locking cage has webs adjoining the lateral marginal region, which webs are provided with snap-in holes into which the projections engage. These snap-in holes are designed such that in the locking position of the locking unit they form a positive fit with the profilings of the sanding segments

and in the releasing position the sanding segments can be removed from the pad elements without tools. In order to generate the axial movement of the locking unit, i.e., its movement running in the direction of the rotation axis of the rotary sanding tool, provision is made for it to have a retaining ring on which the locking cage is mounted and for the retaining ring to be coupled by a rotatable adjusting nut in such a way that the locking unit executes a linear movement by turning of the adjusting nut. To this end it is expedient if the hub of each rotary sanding tool has a threaded stud onto which the adjusting nut is screwed. In a preferred embodiment it is provided that the rotary sanding tool is fashioned as a double-segment sanding wheel and that on each of the averted sides of the double sanding wheel there is an axially movable retaining ring. The cage for locking of the sanding segments is then arranged in turn on each retaining ring. The thickness of the locking cage is configured such that it is inherently stable in shape and does not deform even at the relatively high rotational speed of the rotary sanding tool in service.

In a preferred embodiment, the pad elements are mounted on the pad by mechanical connectors. Because the pad and the pad elements are designed such that a positive fit results, it is sufficient if one connector is used for each pad element. Screws that are screwed into the pad in the radial direction are preferred. For true running, each locking unit must be worked precisely. The truth of running should be less than 1/10 mm. As already indicated, the rotational speed of the rotary sanding tool in service is relatively high, a maximum of about 3000 rpm but in the normal case around 1500 rpm. For this reason, provision is further made that each rotary tool has an internal hub extending over the width or approximately over the entire width of the rotary sanding tool and that the hub is fashioned as a centering cone or equipped with a conical centering bushing. The rotary sanding tool under consideration can

also be fashioned as a single-segment sanding wheel. It is particularly advantageous then that a workpiece held by a support plate can be sanded approximately down to the support surface. The so-called interference height in this embodiment is extremely small, thus making the use still more versatile.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be explained in more detail on the basis of the appended drawings, in which:

Figure 1 shows two rotary sanding tools mounted on a sanding shaft, not shown, and

Figure 2 is a partial view showing in particular the unlocking of the sanding segments.

DETAILED DESCRIPTION OF THE INVENTION

For purposes of illustration, Figure 1 shows only two rotary sanding tools 10 and 11, which are mounted on a sanding shaft, not shown. In practice, more than two rotary sanding tools 10, 11 are commonly mounted on a sanding shaft. Contrary to the illustration in Figure 1, the sanding shaft in a machining center is vertical. Rotary sanding tool 10 shown in Figure 1 is fashioned as a double-segment sanding wheel. In such an embodiment, two internal pads, which cannot be seen, are stuck one into the other or interlaced one with the other. The pad elements are alternately assigned to the one and the other pad, accordingly also sanding segments 12, 22 visible in Figure 1, which are externally coated with an abrasive coating or an abrasive paper. The shape of the pad elements and of the slipped-on sanding segments is dictated by the outline of the surface to be sanded. In Figure 1 sanding segments 12, 22 of rotary sanding tools 10, 11 are designed alike for simplicity in depiction even though this does not conform to practice. Each rotary sanding tool 10, 11 is equipped with a locking mechanism 13, yet to be explained in more detail, the rotary sanding tool in the case of the

rotary sanding wheel at bottom in the illustration being equipped with two locking units 13, which locking mechanism is assigned to each row of sanding segments 12, 22. Each locking unit 13 is essentially made up of a peripheral locking cage 14, each of which is mounted on a retaining ring 15. Figure 1 shows that sanding segments 12 are alternately assigned to left-hand retaining ring 15 and right-hand retaining ring 15. Each sanding segment is provided with a profiling on the two lower averted sides, i.e. the side averted from abrasive coating 12a, which profiling is positively connected to assigned locking cage 14 in the locked position shown in Figure 1. In the exemplary embodiment shown, the profiling is formed by semicircular projections 16, which can be seen particularly from Figure 2. These projections 16 of sanding segments 12, 22 are slipped onto protruding lugs 17 of the pad, which is otherwise not further shown. Locking cage 14 is provided with groove-like holes, which are designed such that in the unlocked position according to Figure 2 each sanding segment 12, 22 can be removed from assigned pad element 18 or slipped on by hand. The movement of each locking unit 13 from the locking position shown in Figure 1 to the unlocking position shown in Figure 2 is effected by axial displacement. To this end, each retaining ring 15 is coupled to a rotatable adjusting nut 19 in such a way that the axial movement results from turning of adjusting nut 19. To this end, each adjusting nut 19 is screwed onto an externally threaded stud of the hub, not shown. The locking cage is essentially made up of profile pieces perpendicularly attached to retaining ring 15, which profile pieces are assigned to the two longitudinal edge regions, leading and trailing in the rotation direction of rotary sanding tool 10, 11. It can be seen in particular from Figure 1 that sanding segments 12, 22 can be changed without the need to take rotary sanding tools 10 off the sanding shaft in the event that a plurality of these rotary sanding tools are stuck onto one sanding shaft. The changing of

sanding segments 12, 22 becomes necessary when abrasive coating 12a is worn out. If they must be replaced by sanding segments with a different outline, changing of pad elements 18 is also necessary. These are connected to the pad in a fashion not shown in greater detail. In a preferred embodiment, this is effected by screws running in the radial direction, because the screw holes are then covered by sanding segments 12. For the changing of pad elements 18, these are then particularly accessible, for example with a screwdriver or with a pin wrench.

From Figure 1 it can be seen in particular that a workpiece held by a support plate can be sanded approximately down to the surface of the support surface with upper rotary sanding tool 11 fashioned as a single sanding wheel. The so-called interference height is extremely small because of the way in which the sanding wheel is constructed. In the embodiment of Figure 1, the underlying threaded stud with adjusting nut 19 would already belong to lower rotary sanding tool 10, so that the support surface could be equated with the frontal surface of the threaded stud.

The invention is not restricted to the exemplary embodiment shown. What is essential is that, in a machining center for moldings of wood or a wood-like material, sanding segments 12 and if applicable also pad elements 18 can be changed without the need to take rotary sanding tools 10 off the sanding shaft.